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A View from the Bush: Space, Environment and the Historiography of Science

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Résumé: Cet article étudie les rapports interdisciplinaires entre l'histoire de la science, la géographie historique et l'histoire environnementale. Quatre approches ont influencé les récentes études : une approche spatiale élaborée essentiellement, mais pas exclusivement, dans le domaine de la géographie qui met l'accent sur les problèmes d'espace, de lieu, de localisation et de circulation; deuxièmement, une approche disciplinaire qui se consacre à l'historique des disciplines environnementales ; troisièmement, une approche axée sur la science et le changement comportant des ouvrages qui mettent l'accent sur le rôle de la science dans les changements environnementaux ; et, quatrièmement, une approche écospatiale qui comprend des études cherchant à prendre part aux historiographies de la science, de l'environnement et de la spatialité, ainsi qu'à établir des liens entre elles. Je soutiens que ces approches ont créé de nouveaux rapports entre des domaines que l'on devrait promouvoir et approfondir.

Abstract: This paper examines the interdisciplinary connections among the history of science, historical geography and environmental history. Four approaches have shaped recent scholarship: a spatial approach developed primarily but not exclusively within the discipline of geography that emphasizes problems of space, place, location and circulation; second, a disciplinary approach which pursues histories of environmental disciplines; third, a science and change approach containing works which emphasize the role of science in environmental change; and fourth an eco-spatial approach which includes studies that seek to engage with and link historiographies of science, environment and spatiality. I argue that these approaches have created new connections between fields that should be fostered and extended.

The historiography of science grows like a tree, in too many directions and with the speed of a poplar, making it difficult to prune and shape in a brief review essay. My task is harder still because I look at this tree from a neighbouring bush, some of whose branches cross the tree's, but many of which do not. I teach historical geography, but I trained as an environmental historian and took a comp exam in the history of science in

graduate school. I have written about past environmental change and environmental debates and have always considered the role of science and scientists to be important and sometimes fundamental to my concerns.¹ These are my thin credentials for pontificating about the historiography of science and so I hope you will forgive me if I take a necessarily narrow and interested glance at the field. I offer, as it were, a view from the bush, with a crude axe in hand.

It seems to me that at least two interesting things are emerging at the edges of the historiography of science: one is an increasing concern with problems of space and spatiality, and the other is a related interest in problems of the environment. Some of these emphases are of fairly long standing. Spatial concerns have appeared across the literature from the work of Bruno Latour on labs and networks to Steven Shapin's writings on the places of scientific experiment and demonstration, and there is now a heavy library shelf filled with monographs on environmental sciences.² However, the direction of this work and the disciplinary contexts in which it flourishes have recently shifted. Historical geographers and environmental historians have increasingly sought to build upon historiographies of science to place their own particular concerns and scholarly subjects under fresh scrutiny. My brief then will consider the contributions of these neighbouring fields to the historiography of science, with the aims of suggesting some of the directions that scholarship has taken and of observing the influence of historiographies of science on new interdisciplinary discussions.³

Using the axe I promised, I will emphasize four roughly hewn categories that describe some of the approaches I have found most stimulating: first, a *spatial approach* developed primarily but not exclusively within the discipline of geography that emphasizes problems of space, place, location and circulation; second, and perhaps most familiar to historians of science, a *disciplinary approach* which provides histories of environmental disciplines; third, a *science and change approach* containing

1. I have engaged themes in the history of science most directly in *Fish versus Power: An Environmental History of the Fraser River* (Cambridge and New York: Cambridge University Press, 2004) and "Locating Science, Locating Salmon: Institutions, Linkages, and Spatial Practices in early British Columbia Fisheries Science," *Environment and Planning D: Society and Space* 22, 3 (2004): 355-372.

2. See, for example, Bruno Latour, *Science in Action* (Cambridge: Harvard University Press, 1987), and Steven Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago: University of Chicago Press, 1994).

3. For a related examination of the connections between the history of technology and environmental history, see: Jeffrey K. Stine and Joel A. Tarr, "At the Intersection of Histories of Technology and the Environment," *Technology and Culture* 39, 4 (1998): 601-640.

works which emphasize the role of science in environmental change; and fourth an *eco-spatial approach* which encompasses studies that seek to engage with and link historiographies of science, environment and spatiality. These categories do not include all work occurring between geography, environmental history and the history of science—far from it, but they do point to some of the most interesting work at the crossroads.

Historical geographers and environmental historians have approached the history of science somewhat differently and it is well to consider some of those differences. David Livingstone has become one of the most prominent and prolific advocates of a so-called historical geography of science, a fundamentally spatial approach. He has sought to inspire his colleagues to reimagine the history of their discipline and to engage with the wide body of scholarship treating spatial themes in the historiography of science.⁴ In part, this advocacy is driven by a desire to add a more geographical dimension to the history of science broadly conceived, but it is also based on a frustration with the way in which the history of geography has been written. There is a profound irony in Livingstone's observation that historians of geography have paid little attention to the spatial aspects of that history. He would like to see geographers re-examine their discipline using the intellectual tools of that discipline—thinking with and through such spatial concepts as location, site and situation. Livingstone has illustrated this approach ably several times, most recently with a fascinating set of essays entitled, *Putting Science in Its Place*. Using a broad canvas of places and episodes in the history of science, Livingstone treats such topics as the conditioning effects of place on scientific investigation, the influence of science on local regional cultures and *vice versa*, and the problems of moving scientific ideas and objects from place to place.⁵ His title underlines his contention that ideas and scientific practices happen in places and must be understood also in their spatial patterns and contexts.⁶

Approaches related to Livingstone's have recently appeared in the geographical literature; their sheer variety points to the many directions that his proposed agenda might take. A recent theme issue of the journal

4. David N. Livingstone, "The Spaces of Knowledge: Contributions Towards a Historical Geography of Science," *Environment and Planning D: Society and Space* 13 (1995): 5-34; "Putting Geography in Its Place," *Australian Geographical Studies* 38, 1 (2000): 1-9.

5. David N. Livingstone, *Putting Science in Its Place: Geographies of Scientific Knowledge* (University of Chicago Press, 2003). Livingstone worked through some of these ideas in an earlier set of lectures. See David N. Livingstone, *Science, Space and Hermeneutics* (Heidelberg: University of Heidelberg, 2001).

6. Livingstone, *Putting Science in Its Place*.

Cultural Geographies, for example, focuses on what editor Philip Crang calls "field cultures"—or the body of ideas and practices at the center of geographical practices outside the laboratory and in the various fields defined and realized in geographical investigations.⁷ Thus Laura Cameron and David Matless examine the complex political, personal and scientific interplay of ideas in the thinking of Marietta Pallis, an early twentieth century ecologist and artist who conducted fieldwork in the Danube delta on floating reeds. They see her work not only bound up in a social context but also redrawing the boundaries of nature and culture through language and metaphor, practice and perspective, and shifting social identities.⁸ Simon Naylor's paper on the practices and ideas of antiquarians in nineteenth century Cornwall is another attempt to inflect the history of science with a cultural geographical sensibility and approach. Naylor seeks to understand how cultures of place are wrought through a complex reading of local societies and the boundaries of knowledge. He is interested how objects and sites that had once been viewed as place-specific antiquities became objects of cultural history comparable with other objects, places and times.⁹ From a rather different perspective, drawing upon oral historical investigation and participant observation, Hayden Lorimer examines the experience of individuals in a geographical field school in Glenmore, Scotland. Through the memories of one participant who attended the field trip as a teenager and then later as a guest in her sixties, Lorimer offers a history of geography viewed from a pedagogical and personal perspective. It is a revealing approach, emphasizing the place of experiential learning in the making of a disciplinary way of seeing.¹⁰ Each of these papers—and my examples are merely illustrative of a growing body of literature, not by any means exhaustive—would seem to respond, more or less directly, to Livingstone's call for a more spatially defined history of geography. I suspect, however, that these scholars do not see their mission simply as the history of a discipline, but wish to apply a geographical approach to the history of ideas and of science more broadly. Geography might serve as an example of a process, but need not be its only focus.

7. Philip Crang, "Introduction: Field Cultures," *Cultural Geographies* 10 (2003): 251-252.

8. Laura Cameron and David Matless, "Benign Ecology: Marietta Pallis and the Floating Fen of the Delta of the Danube, 1912-1916," *Cultural Geographies* 10 (2003): 253-277.

9. Simon Naylor, "Collecting Quoits: Field Cultures in the History of Cornish Antiquarianism," *Cultural Geographies* 10 (2003): 309-333.

10. Hayden Lorimer, "The Geographical Field Course as Active Archive," *Cultural Geographies* 10 (2003): 278-308.

It is perhaps not coincidental that much of the best work emerging within geography on the spatial aspects of the history of science has focused on issues related to fieldwork. The practice of fieldwork has broader importance in the discipline and critical self-examinations within geography parallel those that have gone on over the last few decades in neighbouring fields such as anthropology.¹¹ More than that, however, the interest in fieldwork complements that in the historiography of science. Although a good deal of research has appeared since Jan Golinski underlined the relative paucity of this literature in his historiographic essay, *Making Natural Knowledge*, the body of work that takes an explicitly spatial perspective remains small.¹² Perhaps the most important recent contribution to appear is Robert Kohler's intriguing new book, *Landscapes and Labscapes*. Conceived as an attempt to understand the linkages drawn within various field sciences between laboratory and fieldwork, Kohler adopts an explicitly geographical dimension in his study and, at several places, describes his work as a cultural geography of science. He sees labs and fields as bounded but porous zones defined as distinct places of investigation and yet shot through with spatial processes linking one with the other. Objects and persons move between these zones, through complex processes of negotiation and translation. Institutions such as marine stations seek to establish an almost laboratory control on an unmarked and open-ended field. The tensions between these poles in Kohler's study creates a fascinating and refreshing dynamic in the history of various biological disciplines. Although some geographers might observe that Kohler relies too heavily on spatial metaphors and foregoes important opportunities to examine spatial processes and patterns, there is much to be learned from this important new work, both about the links between lab and field and about how a history of science sensitive to questions of space might be conceived and written.¹³

Whereas historical geographers have been drawn to recent work in the history of science emphasizing spatial themes and have sought to extend a geographical perspective to histories of geography and other sciences, environmental historians have approached the history of science with rather different concerns: to understand the place of science in reimagining the natural world, and to analyze how science has been used to trans-

11. See, for example, the special fieldwork issue of *Geographical Review* (2001).

12. Jan Golinski, *Making Natural Knowledge: Constructivism and the History of Science* (Cambridge: Cambridge University Press, 1998).

13. Robert E. Kohler, *Landscapes and Labscapes: Exploring the Lab-Field Border in Biology* (Chicago: University of Chicago Press, 2002).

form it. Environmental not spatial problems lie at the centre of analysis and, although these problems frequently overlap, they can and have been treated separately. This different emphasis has been evident for some time.

Two early studies at the edge of environmental history and the history of science, Donald Worster's *Nature's Economy: A History of Ecological Ideas* and Carolyn Merchant's *The Death of Nature*, sought to understand changing scientific ideas of nature from a contextual perspective.¹⁴ They stressed both the importance of broader social influences and environmental changes in shaping science's methods, metaphors and meanings. To some extent they read the history of science in order to grasp the origin of powerful discourses of nature. However, they also wished to emphasize how those ideas, put into practice, brought changes to the natural world—legitimizing gendered discourses and actions of land conquest and mechanization in Merchant's study, rationalizing programs of resource management and imperialist visions of westward expansion in Worster's. Science was not a neutral, disembodied discourse of reason, in these studies, but an active social force in society and on the environment.

Although I will not attempt to recount how environmental historians have variously engaged history of science approaches over time, I think it is fair to say that Worster and Merchant's work signalled the beginnings of many such engagements. From the analysis and consideration of fisheries science in Arthur McEvoy's studies of ecology and law in the California fisheries to Thomas Dunlap's treatment of chemistry and science in the public sphere in his analysis of the DDT controversy, environmental historians increasingly integrated a history of science approach into the broadly defined tool kit which they brought to bear in studies of human-environment relations.¹⁵ In general, environmental historians have written about science in a fairly conventional contextualist vein. They have been more innovative in the ways in which they have juxtaposed histories of science with other concerns and disciplinary perspectives, positioning science within social and institutional contexts, but also in

14. Donald Worster, *Nature's Economy: A History of Ecological Ideas* (Cambridge and New York: Cambridge University Press, 1985 [1977]); Carolyn Merchant, *The Death of Nature: Women, Ecology and the Scientific Revolution* (San Francisco: Harper Collins, 1980).

15. Arthur F. McEvoy, *The Fisherman's Problem: Ecology and Law in the California Fisheries, 1850-1980* (Cambridge: Cambridge University Press, 1986); Thomas R. Dunlap, *DDT: Scientists, Citizens and Public Policy* (Princeton: Princeton University Press, 1981).

ponds and oceans, garbage dumps and toxic soups, as well as precariously on slopes that slide away.

Richard White has argued recently that the border between environmental history and the history of science has been one of the most productive sites in environmental history in the past decade, a place where "a meshing of concerns" has produced new dialogue and opportunity. One example of this dialogue, not easily captured by citation counts and publications, is the fact that White assigns historians of science in his graduate seminars in environmental history.¹⁶ These observations may suggest as much about White's own trajectory as a scholar as about the field of environmental history as a whole, but I think he is correct to see increased activity and innovation on the edge of these two fields. It remains, however, to give some form to this "meshing of concerns," to ask how environmental history has overlapped the history of science and to what ends? The connections and crossovers are of various kinds. Some environmental historians have wished to use historical scientific records in order to elaborate past environmental changes—notwithstanding considerable difficulties in establishing the precision and indeed meaning of such evidence. Others have incorporated approaches from cultural and science studies and looked at questions of hybridity in human-nature relations, seeking ultimately to disrupt notions of a human-environment binary. Still others have analyzed the politics of science in environmental debate, asking how political interests have shaped science and how science has shaped environmental politics. There is a great cacophony of voices too numerous and loud to repeat or mimic briefly. Only by returning to my roughly hewn categories can I create the pretence of order.

The disciplinary approach has its own long history within the historiography of science. However, studies that focus on environmental disciplines, which frame their investigations around the development of a field of inquiry, or a line of research and take inspiration both from the historiography of science and environmental history are comparatively recent and rare. Peter Bowler's history of environmental sciences might be offered as the best known example of this kind of crossover work, written by an historian of science, but of interest to many environmental historians.¹⁷ The profusion of studies in the history of ecology in recent years should also be noted, even if the variety of approaches cannot be well

16. Richard White, "Environmental History: Watching A Historical Field Mature," *Pacific Historical Review* 70, 1 (2001): 103-111.

17. Peter J. Bowler, *The Earth Encompassed: A History of the Environmental Sciences* (New York: W.W. Norton, 2000).

summarized. I think, for example, of Libby Robin's essay on ecology as a science of empire in Australia, or more generally, of Tom Dunlap's concern to understand the varied histories of ecology in what he calls Anglo settler societies.¹⁸ It might be enough to point to Stephen Bocking's *Ecologists and Environmental Politics* to suggest that some studies that might be classified under the heading of disciplinary histories move well beyond its boundaries. In Bocking's case, a study of the discipline of ecology becomes a comparative analysis of several prominent research nodes in Canada, the United States and England, drawn against the relief of shifting political, institutional and environmental contexts.¹⁹

The science and change approach encompasses those studies that seek to examine scientific and environmental change as mutually constitutive processes or forces. Scholars working with this broad idea have generally examined topics in the field sciences, or resource management, subjects that lend themselves to examinations of science in action in the field and of fields in action in science. For example, in *True Gardens of the Gods*, Ian Tyrrell examines a host of transnational environmental exchanges between Australia and California and in the process considers a range of agricultural sciences caught up in a complex dialogue with shifting environmental conditions, shaped not only by settler actions on the land, but also by a range of introductions of plants and animals. Agricultural scientists and land management officials struggle to understand the environmental changes before them while at the same time unleashing new forces on the landscape, introducing insects here and redirecting rivers there.²⁰

The tangle and the paradox of the mutually constitutive forces of science and environmental change are also evident in Nancy Langston's beautifully written *Forest Dreams, Forest Nightmares*, a study of forestry in the US inland west. Langston's book attempts to unravel the complex ways in which early foresters, schooled in the east and steeped in the assumptions of the Yale forestry school, perceived the forest and sought to protect and improve it. It is ultimately an ironic tale, because the foresters' actions unwittingly changed the forest regime, affected the

18. Libby Robin, "Ecology: A Science of Empire?" in *Ecology and Empire: Environmental History of Settler Societies*, eds. Tom Griffiths and Libby Robin (Seattle: University of Washington Press, 1997), 63-75; Thomas R. Dunlap, *Nature and the English Diaspora: Environment and History in the United States, Canada, Australia and New Zealand* (Cambridge and New York: Cambridge University Press, 1999).

19. Stephen Bocking, *Ecologists and Environmental Politics: A History of Contemporary Ecology* (New Haven: Yale University Press, 1997).

20. Ian Tyrrell, *True Gardens of the Gods: Californian-Australian Environmental Reform, 1860-1930* (Berkeley: University of California Press, 1999).

incidence and intensity of fire in the region and favoured new species of trees. Langston is interested both in how those changes came about, but also in how scientific ideas shaped action, and in turn altered in response to new evidence and changing environmental conditions.²¹ The science and change approach emphasizes, in my view, the importance of extending what has been meant traditionally by a contextual approach to include not only scientific institutions and their politics, not only broader questions of society, identity and language, but also environmental contexts. This means treating the natural world not only as a text upon which cultural assumptions and meanings are projected, but also as a changing terrain, in which natural changes, partly shaped by human actions and by environmental processes, bear consideration and reflection.

This brings me to my fourth category, the eco-spatial approach, covering studies that approach the history of science with an interest both in the environmental contexts and effects of knowledge, and the spatial aspects of knowledge creation. To put the matter somewhat differently, I am seeking to identify work that connects both with those innovative spatial approaches in the historical geography of science I described at the outset, and with work on science and environmental change emerging in environmental historiography.

Few works have developed such a line of inquiry explicitly. Joseph Taylor's *Making Salmon*, a study of the tortured history of salmon conservation on the Columbia River, invokes a spatial and geographical perspective, but without close connection to the historical geography of science literature. Nevertheless, he brings his spatial analysis to bear on the history of fish culture, the study and practice of managing and raising fish populations in captivity. He situates fish culture ably both within a complex web of environmental agencies and the debates over fisheries management among contending social groups. However, he never loses sight of the fact that fish culture was practiced in particular places with effects on particular salmon runs and on the overall processes and patterns of the Columbia fisheries. One of Taylor's maps, for example, plots the origin and distribution points of fish eggs captured and reared by fisheries officials throughout the US Pacific Northwest. The map demonstrates the broader effects of discrete actions and the cumulative impact of fish culture in mixing up, as it were, the population groups of several Pacific salmon species.²²

21. Nancy Langston, *Forest Dreams, Forest Nightmares: The Paradox of Old Growth in the Inland West* (Seattle: University of Washington Press, 1995).

22. Joseph E. Taylor III, *Making Salmon: An Environmental History of the Northwest Fisheries Crisis* (Seattle: University of Washington Press, 1999).

In a different context, Richard Grove's extraordinary book, *Green Imperialism*, a study of environmental sciences conducted in colonial peripheries, makes no pretence to an historical geography of science and yet offers a fundamentally spatial perspective in its attention to the places of knowledge creation at the edges of empire, and the environmental contexts and changes which gave rise to new explorations and initiatives in natural history, resource conservation and imperial policy.²³ Grove's analysis shows a remarkable attention to the details of place and environmental context, but also demonstrates that imperial expansion encompassed new ideas as well as environments. Scientists incorporated new names as well as new specimens on the edge, and new ways of thinking about the natural world, in the course of their encounters with subject peoples and colonized spaces. Work of this kind emphasizes the importance of analyzing problems of location, distance, space and place, in unravelling the complex interactions between scientific ideas and practices, as well as a changing natural world.

My enthusiasm for this eco-spatial approach grows from my partial perspective at the intersection of several disciplines but also from a conviction that a greater spatial emphasis in environmental history would enhance already complex narratives, and that a greater environmental emphasis in the historical geography of science would invigorate a growing and important sub-field and take it in new directions. I recognize that some scholars view environmental history and historical geography as beginning from different assumptions, using different metaphors and therefore operating on utterly different planes of analysis, but I hope that the examples of Taylor and Grove's work suggest that this generalization need not be so and perhaps should not be so.²⁴ On a concluding and optimistic note, I should add that although my points of reference have been drawn from the international literature, Canadians have contributed substantially to this emerging eco-spatial approach. Recent papers by Suzanne Zeller, for example, have illustrated the promise of applying the insights of historians of science to problems that bear also on environmental history.²⁵

23. Richard H. Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens and the Origins of Conservation, 1600-1860* (Cambridge: Cambridge University Press, 1995).

24. David Demeritt, "The Nature of Metaphors in Cultural Geography and Environmental History," *Progress in Human Geography* 18, 2 (1994): 163-185.

25. Suzanne Zeller, "Darwin Meets the Engineers: Scientizing the Forest at McGill University, 1890-1910," *Environmental History* 6, 3 (2001): 428-450; "Classical Codes: Biogeographical Assessments of Environment in Victorian Canada," *Journal of*

These are reflections drawn from a particular perspective, caught uncomfortably in a bush, wielding an axe. Much of my commentary does not bear centrally on the historiography of science, but it does suggest how historiographies of science have travelled to other places, moved through space, disturbed otherwise Edenic environments, implanted a few hardy weeds and mixed up studies of space and environment in thoroughly productive ways. The movement has occurred in two directions of course. I hesitate to call it a Columbian Exchange, but the processes of trading ideas and approaches, problems and perspectives has been important and consequential and disrupted what might have been the Old World of the historiography of science as well as numerous New World historiographies beyond.